



Cavity Nesting Ducks

Barrow's Goldeneye - *Bucephala islandica*
 Common Goldeneye - *Bucephala clangula*
 Hooded Merganser - *Lophodytes cucullatus*
 Bufflehead - *Bucephala albeola*
 Wood Duck - *Aix sponsa*

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GENERAL RANGE AND WASHINGTON DISTRIBUTION

These five species of cavity-nesting ducks vary in distribution. The breeding and wintering ranges of the Barrow's goldeneye (*Bucephala islandica*) and the bufflehead (*Bucephala albeola*) extend from Alaska to California. The wood duck (*Aix sponsa*) and hooded merganser (*Lophodytes cucullatus*) winter south of Alaska and breed from British Columbia southward. The common goldeneye winters from Alaska to California and breeds in isolated areas of Washington northward to Alaska (Bellrose 1976).

Washington is one of a very few states where all 5 species are known to breed (Matt Monda, personal communication). The Barrow's goldeneye is widespread and breeds within the Cascades and in north-central Washington (see Figure 1). A unique population of Barrow's goldeneye nest in cavities within the talus slopes and basalt cliffs surrounding Lake Lenore and Alkali Lake in central Washington (Matt Monda, personal communication). Buffleheads are only known to breed south of Spokane on Turnbull National Wildlife Refuge and at Big Meadow Lake in Pend Oreille County (see Figure 2; Smith et al. 1997). The common goldeneye breeds in a few isolated areas in northeastern Washington (see Figure 3). Breeding areas for hooded mergansers and wood ducks are more widespread, primarily in the western part of the state, but they also breed in eastern Washington where adequate habitat occurs (see Figure 4; Smith et al. 1997). In addition, large concentrations of

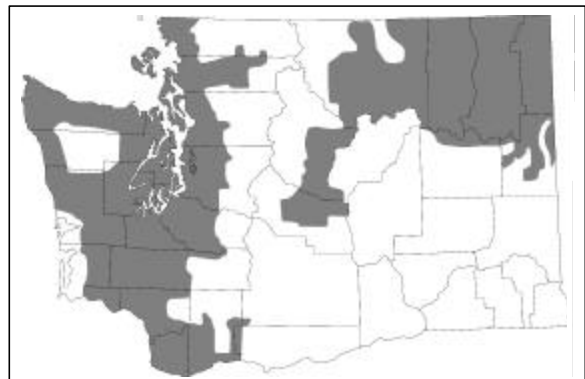


Figure 1. Breeding range of the Barrow's goldeneye (*Bucephala islandica*) in Washington. Map derived from GAP Analysis of Washington. Smith et al. 1997).



Figure 2. Breeding Distribution of the Bufflehead (*Bucephala Clangula*) in Washington. Map derived from GAP Analysis of Washington (Smith et al. 1997).

breeding wood ducks occur in the Yakima valley (see Figure 5; Matt Monda, personal communication).

All five species can be found in larger numbers during migration. Though wood ducks typically winter further south than Washington, significant wintering numbers can be found in the Yakima Valley and the Columbia River estuary. Goldeneyes and buffleheads winter in large numbers on Puget Sound and larger rivers. Hooded Mergansers are less common but winter in a wide variety of habitats (Matt Monda, personal communication).

RATIONALE

Cavity-nesting ducks provide recreation to hunters and bird watchers, and they are vulnerable to loss of nesting habitat. These species require nesting cavities within trees and snags, which are commonly lost through commercial forestry, firewood cutting, and shoreline development. All but the wood duck exhibit low productivity and low population sizes, breed for the first time at an older age, and are poor pioneers of unoccupied habitats (Goudie et al. 1994). Common goldeneye and bufflehead are the least common breeding ducks in the state. Loss of suitable nesting sites will eliminate use of an area by breeding birds.

HABITAT REQUIREMENTS

In Washington, cavity-nesting ducks nest primarily in late-successional forests and riparian areas adjacent to low gradient rivers, sloughs, lakes, and beaver ponds (Thomas 1979, Brown 1985, Parker 1990). Animal matter can comprise over 75% of the diets of the hooded merganser, bufflehead, common goldeneye and Barrow's goldeneye. These species feed primarily on aquatic insects, mollusks, crustaceans, and small fish (Gauthier 1993, Dugger et al. 1994, Fitzner and Gray 1994, Eadie et al. 1995, Hepp and Bellrose 1995). Wood ducks up to 6 weeks old depend on animal matter, while older ducklings and adult wood ducks feed on aquatic and emergent plants, acorns, grain, and other seeds (Bellrose and Holm 1994).

Nest Site Characteristics

These 5 species of ducks nest almost exclusively in tree cavities, which offer protection from weather and predators. They are secondary cavity nesters, using cavities created by large woodpeckers or by decay or damage to the tree. Cavity use is dependent on the proximity of suitable brood habitat, predator levels, and competition (and perhaps brood parasitism) from the other cavity-nesting species (Peterson and Gauthier 1985, Dugger et al. 1994, Eadie et al. 1995, Robb and Bookhout 1995). Nest site fidelity is common,

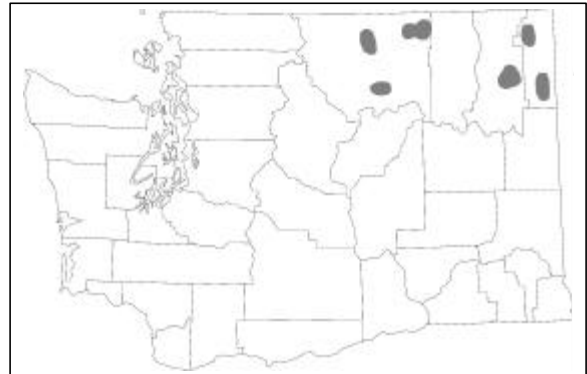


Figure 3. Breeding distribution of the common goldeneye in Washington. Map derived from GAP Analysis of Washington (Smith et al. 1997).



Figure 4. Breeding distribution of the hooded merganser (*Lophodytes cucullatus*) in Washington. Map derived from GAP Analysis of Washington (Smith et al. 1997).



Figure 5. Breeding range of the wood duck (*Aix sponsa*) in Washington. Map derived from GAP Analysis of Washington (Smith et al. 1997).

especially at successful nests (Dow and Fredga 1984, Hepp and Kennamer 1992, Gauthier 1993, Dugger et al. 1994). Population levels of cavity-nesting ducks can be related to the availability of nesting sites (Dow and Fredga 1984, Gauthier 1993, Dugger et al. 1994, Eadie et al. 1995, Hepp and Bellrose 1995).

In general, minimum cavity dimensions that will accommodate all 5 species include an entrance hole at least 9 cm (3.5 in) in diameter, with the internal cavity 25 cm (10 in) deep and 19 cm (7.5 in) in diameter (Gauthier 1993, Dugger et al. 1994, Eadie et al. 1995, Robb and Bookhout 1995). The bufflehead, however, appears to prefer smaller cavity entrances (6.5 cm diameter [2.5 in]; flicker nests are ideal) which may reduce nest-site competition and brood parasitism from larger ducks (especially goldeneyes) (Gauthier 1993). Hooded mergansers have less specific nest-cavity preferences, but they prefer nest sites that are within or very near brood habitat (Dugger et al. 1994). Nest trees should have a diameter at breast height (dbh) of 30 cm (12 in) (Soulliere 1988), but all 5 species typically use nest trees >60 cm (24 in) dbh. These ducks will use tree cavities that occur above 20 m (66 ft), but they generally use cavities 2-15 m (6-49 ft) above the ground or water. The canopy around a cavity is generally open and does not overhang the entrance (Bellrose 1976). Optimal density of potential nest trees is 12.5/ha (5/ac) (Sousa and Farmer 1983).

Brood Habitat

Shallow wetlands within 0.8 km (0.5 mi) of cavities provide optimal brood habitat for all cavity-nesting ducks. Wood ducks typically use habitats with 50-75% overhanging woody vegetation and/or emergent vegetation for brood escape cover (Sousa and Farmer 1983); all 5 species use downed logs or low islands for loafing (Webster and McGilvrey 1966, Gauthier 1993, Dugger et al. 1994, Eadie et al. 1995, Hepp and Bellrose 1995). Both goldeneye species and the bufflehead typically use more open water with less emergent vegetation as brood habitat (Gauthier 1993, Dugger et al. 1994, Eadie et al. 1995). Common goldeneyes prefer acidic and fishless waters where there is little or no competition from fish for aquatic insects (Gauthier 1993, Poysa and Virtanen 1994, Eadie et al. 1995).

LIMITING FACTORS

Population levels of cavity-nesting ducks can be limited by the availability of suitable nesting sites, adequate brood escape cover, foraging areas, nest predation, and nest parasitism (Dow and Fredga 1984, Gauthier 1993, Bellrose and Holm 1994, Dugger et al. 1994, Eadie et al. 1995, Hepp and Bellrose 1995). Human disturbance of nesting ducks may affect productivity. Destruction of cavity trees can eliminate these species from an area (Matt Monda, personal communication).

The use of herbicides or pesticides near wetlands may affect cavity-nesting ducks by lowering the numbers of invertebrates, and by adversely affecting aquatic and emergent vegetation. All of these ducks are known to accumulate toxins in their tissues, especially in areas where toxins are elevated, such as downstream from mines, pulp and paper mills (Blus et al. 1993, Swift et al. 1993, Vermeer et al. 1993, Champoux 1996).

MANAGEMENT RECOMMENDATIONS

An adequate supply of nest cavities is the key to supporting populations of cavity-nesting ducks in Washington. Land management activities designed to promote healthy populations of these 5 duck species should ensure a continuous supply of available nest cavities.

Snags and cavity trees near suitable wetlands should be preserved and created to achieve a minimum density of 12.5 potential nest cavities/ha (5/ac) (McGilvrey 1968). Snags and cavity trees should have a minimum diameter of 30 cm (12 in), although a diameter of 60 cm (24 in) is preferred (McGilvrey 1968).

In general, the following nest cavity characteristics will accommodate all five species and should be considered when evaluating potential nest sites:

- an elliptical entrance hole at least 9 cm (3.5 in) in diameter (buffleheads may prefer smaller cavity entrances that are 6.5 cm diameter [2.5 in])
- an internal cavity 25 cm (10 in) deep and 19 cm (7.5 in) in diameter (Gauthier 1993, Dugger et al. 1994, Eadie et al. 1995, Robb and Bookhout 1995)
- cavities 2-15 m (6-49 ft) above the ground or water are generally preferred, although cavities above 20 m (66 ft) in trees will be used
- the canopy around a cavity should be open and not overhang the entrance (Bellrose 1976)

Large woody debris and downed logs should be present, as well as low islands for breeding and brood use (McGilvrey 1968). Flooded timber should not be logged, and woody vegetation along the shores of nesting and brood areas should be retained. In some situations, flooding standing or downed timber may be used to create snags and brood habitat (McGilvrey 1968).

Predator-proof nest boxes for cavity nesting ducks can be used in areas where natural cavity sites are limited but other habitat requirements are met (Bellrose 1976). However, it is unknown how nest boxes affect natural selection or species fitness over time. In some situations, it may not be suitable to consider nest boxes as permanent substitutes for natural cavities. The decision to provide nest boxes to supplement existing cavities or nest boxes should consider occupancy rates of existing suitable nest sites.

Wood duck boxes should be designed and placed following the recommendations of Bellrose and Holm (1994). Boxes for the other four species should follow the guidelines provided by Lumsden et al. (1980) and Gauthier (1993). Nest boxes for cavity nesting ducks are commonly made out of rough-cut lumber. Other materials that can be used include sheet metal and slab wood (Bellrose and Holm 1994).

To minimize the impacts of brood parasitism, predation, and starling use, nest boxes for wood ducks should be placed far enough apart so that one is not visible from the other. (Bellrose and Holm 1994, Semel and Sherman 1995). Bellrose and Holm (1994) recommend a minimum of 46 m (150 ft) between nest box structures. Nest box placement can affect clutch size, rates of brood parasitism, and hatching success in wood ducks. Traditionally placed nest boxes that are grouped together with highly visible entrances often suffer from higher rates of brood parasitism and produce less ducklings over time than nest boxes placed in trees out of sight of each other (Bellrose 1976, Semel and Sherman 1995).

In areas supporting wood ducks, mast-producing (nut producing) trees and shrubs, such as oaks (*Quercus garryana*) and hazelnuts (*Corylus cornuta*), should be maintained.

The use of pesticides or herbicides may negatively affect these species. If pesticide or herbicide use is planned for areas where cavity-nesting ducks occur, refer to Appendix A for useful contacts to help assess the use of pesticides, herbicides, and their alternatives.

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PERSONAL COMMUNICATION

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KEY POINTS

Habitat Requirements

- Cavity-nesting ducks use natural cavities with minimum entrance size of 9 cm (3.5 in) in diameter and minimum internal dimensions of 25 cm (10 in) deep and 19 cm (7.5 in) diameter. Smaller entrances (~6.5 cm [2.5 in]) are preferred by buffleheads.
- Nest trees usually have a minimum dbh of 30 cm (12 in), although 60 cm (24 in) is preferred.
- Natural cavities 2-15 m (6-49 ft) above ground or water are typically used by all 5 species; however, use of cavities over 20 m (66 ft) is not unusual.
- Optimal density of potential nest cavities is 12.5/ha (5/ac), within 0.8 km (0.5 mi) of suitable brood habitat.
- Ideal wood duck brood habitat consists of shallow wetlands with 50-75% cover and abundant downed logs or low islands. Goldeneyes, buffleheads, and to some extent hooded mergansers do not require the amount of emergent vegetation typical of wood duck brood habitat.

Management Recommendations

- Predator-proof nest boxes for cavity nesting ducks can be used in areas where natural cavity sites are limited but other habitat requirements are met. However, in some situations, it may not be suitable to consider nest boxes as permanent substitutes for natural cavities. The decision to provide nest boxes to supplement existing cavities or nest boxes should consider occupancy rates of existing suitable nest sites.
- Wood duck boxes should be designed and placed following the recommendations of Bellrose and Holm (1994). Boxes for the other four species should follow the guidelines provided by Lumsden et al. (1980) and Gauthier (1993).
- To minimize the impacts of brood parasitism, predation, and starling use, nest boxes for wood ducks should be placed far enough apart so that one is not visible from the other. Bellrose and Holm (1994) recommend a minimum of 46 m (50 yd) between nest box structures.
- Snags and cavity trees 30 cm (12 in) (60 cm [24 in] preferred) near suitable wetlands should be maintained to achieve a minimum density of 12.5 potential nest cavities/ha (5/ac).
- Mast-producing trees and shrubs (e.g., oaks, hazelnuts) should be maintained.
- Large woody debris and downed logs should be present, as well as low islands for breeding and brood use.
- Avoid logging flooded timber and leave woody vegetation along the shores of nesting and brood areas. In some situations, flooding standing or downed timber may be used to create snags and brood habitat.
- The use of pesticides or herbicides may negatively affect these species. If pesticide or herbicide use is planned for areas where cavity-nesting ducks occur, refer to Appendix A for contacts useful for assessing pesticides, herbicides and their alternatives.